

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
28 November 2002 (28.11.2002)

PCT

(10) International Publication Number
WO 02/094678 A1

(51) International Patent Classification⁷: **B65D 75/42,**
B65B 9/02

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(21) International Application Number: PCT/US02/16041

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(22) International Filing Date: 21 May 2002 (21.05.2002)

(81) Designated States (*national*): AE, AG, AL, AM, AT (utility model), AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ (utility model), CZ, DE (utility model), DE, DK (utility model), DK, DM, DZ, EC, EE (utility model), EE, ES, FI (utility model), FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK (utility model), SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/293,890 24 May 2001 (24.05.2001) US

(84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),

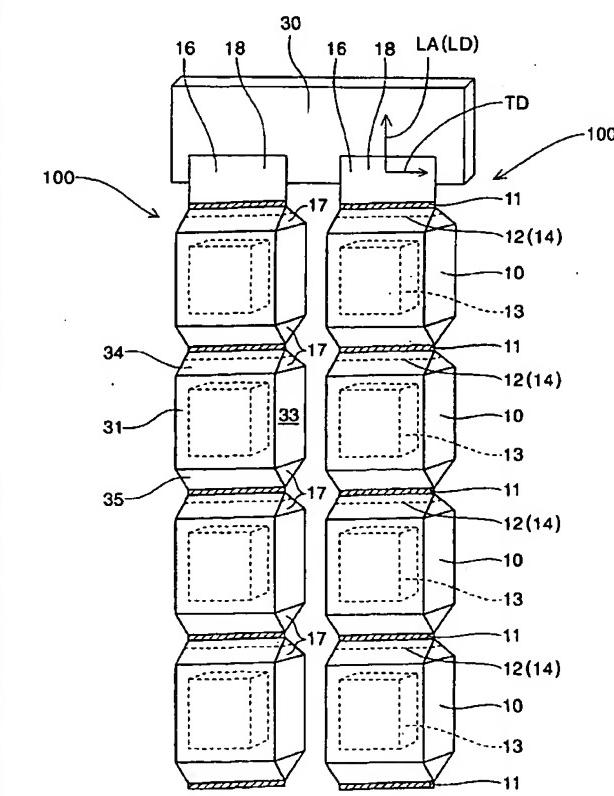
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[Continued on next page]

(54) Title: DISPOSABLE ABSORBENT ARTICLES CONTAINED IN SUCCESSIVELY CONNECTED BAGS



(57) Abstract: The present invention is directed to a disposable absorbent product, comprising: a continuous tube of a thin sheet material having a plurality of unitary seal bands to form a plurality of bags which are successively connected. Each two of the succeeding bags are separated by each one of the unitary seal bands. Each of the bags contains at least one disposable absorbent article. Each of the bags has a separation means formed in the thin film material for separating one of the succeeding bag from the others by tearing. When one of the succeeding bag is separated from the others through the separation means by tearing, the one bag is opened automatically. As a result, the disposable absorbent articles that can be effectively displayed in relatively smaller stores by using a very limited space.

WO 02/094678 A1

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European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SI, SZ, TZ, UG, ZM, ZW), Eurasian patent*

(AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

DISPOSABLE ABSORBENT ARTICLES CONTAINED IN SUCCESSIVELY CONNECTED BAGS

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FIELD

The present invention relates to disposable absorbent products, and more particularly to a disposable absorbent product which includes a plurality of successively connected bags each containing a disposable absorbent article. The 10 present invention further relates to a method for making such a disposable absorbent product.

BACKGROUND

Disposable absorbent articles such as sanitary napkins, tampons, interlabial 15 products, incontinence devices, pantiliners, diapers, incontinent briefs, incontinent undergarments, and training pants are typically worn in the crotch region of an undergarment to receive and contain body fluids. Such disposable absorbent articles function both to contain discharged materials and to isolate these materials from the body of the wearer and from the wearer's garments and bed clothing. 20 Disposable absorbent articles having many different basic designs are known in the art. For example, sanitary napkins are one kind of absorbent article worn by women in a pair of panties that is normally positioned between the wearer's legs, adjacent to the perineal area of the body.

Disposable absorbent articles are typically contained in a flexible bags or a 25 package and sold as a part of household commodities by drug stores and supermarkets. Such drug stores and supermarkets normally have a wide space for displaying commodities. However, it is recently preferred by the consumers or purchasers that disposable absorbent articles are also sold by relatively smaller sized stores such as station stalls and convenient stores. Such smaller stores 30 normally have a very limited space for displaying commodities, in particular for disposable absorbent articles which has a relatively large volume compared with other commodities and require a large space in the horizontal direction for displaying. This fact causes a problem that selling disposable absorbent articles is difficult for smaller sized stores although it is desired by the consumers or 35 purchasers.

As one possible solution which can be considered for solving this problem is to use a shell in smaller sized stores which can store or hold disposable absorbent articles. However, such a shell has a very limited flexibility for storing or holding disposable absorbent articles which have different sizes. In addition, having such a
5 shell also consumes at least some space. Further, such a shell tends to hide disposable absorbent articles by itself.

Based on the foregoing, there is a need for a disposable absorbent product including disposable absorbent articles that can be displayed by using a very limited space. There is also a need for a disposable absorbent product that can effectively
10 display disposable absorbent articles contained therein in relatively smaller stores. Furthermore, there is a need to make such a disposable absorbent product.

SUMMARY

The present invention is directed to a disposable absorbent product,
15 comprising: a continuous tube of a thin sheet material having a plurality of unitary seal bands to form a plurality of bags which are successively connected. Each two of the succeeding bags are separated by each one of the unitary seal bands. Each of the bags contains at least one disposable absorbent article. Each of the bags has a separation means formed in the thin film material for separating one of the
20 succeeding bag from the others by tearing. When one of the succeeding bag is separated from the others through the separation means by tearing, the one bag is opened automatically.

The present invention is also directed to a method for making a disposable absorbent product including a plurality of successively connected bags each containing at least one disposable absorbent article. The method comprises the step of (a) preparing a continuous tube of a thin sheet material having one open end. The continuous tube has a plurality of separation means formed in the continuous tube which are spaced apart with a predetermined distance. The method further comprises the step of (b) supplying at least one disposable
25 absorbent article into the continuous tube from the one open end. The disposable absorbent article is positioned at a first position that is below one of the plurality of separation means. The method further comprises the step of (c) forming a unitary seal band at a second position that is upper than the first position.

The foregoing answers the need for a disposable absorbent product including
35 disposable absorbent articles that can be displayed by using a very limited space. The foregoing also answers the need for a disposable absorbent product that can

effectively display disposable absorbent articles contained therein in relatively smaller stores.

These and other features, aspects, and advantages of the present invention will become evident to those skilled in the art from reading of the present disclosure.

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BRIEF DESCRIPTION OF THE DRAWINGS

While the specification concludes with claims particularly pointing out and distinctly claiming the invention, it is believed that the invention will be better understood from the following description of preferred embodiments taken in conjunction with the accompanying drawings wherein like designations are used to designate substantially identical elements, and in which:

Fig. 1 is a simplified perspective illustration of a disposable absorbent product which is one preferred embodiment of the present invention;

Fig. 2 is a simplified and enlarged perspective illustration of the connection portion of succeeding bags shown in Fig. 1;

Fig. 3 is a simplified and enlarged perspective illustration of the connection portion of succeeding bags which is another preferred embodiment of the present invention;

Fig. 4 is a simplified perspective illustration of a continuous tube of a thin sheet material which is preferably used in the disposable absorbent product shown in Fig. 1; and

Fig. 5 is a simplified plan view of a manufacturing process for the disposable absorbent product shown in Fig. 1.

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DETAILED DESCRIPTION

All cited references are incorporated herein by reference in their entirety. Citation of any reference is not an admission regarding any determination as to its availability as prior art to the claimed invention.

Herein, "comprise", "include" and "contain" mean that other element(s) and step(s) which do not affect the end result can be added. These terms encompass the terms "consisting of" and "consisting essentially of".

Herein, "joined" or "joining" encompasses configurations whereby an element is directly secured to another by affixing the element directly to the other element, and configurations whereby the element is indirectly secured to the other element by affixing the element to intermediate member(s) which in turn are affixed to the other element.

Herein, the term "absorbent article" refers to devices which absorb and contain body exudates, and more specifically, refers to devices which are placed against or in proximity to the body of the wearer to absorb and contain the various body fluids or exudates discharged from the body. The term "disposable" is used
5 herein to describe absorbent articles which are not intended to be laundered or otherwise restored or reused as an absorbent article (i.e., they are intended to be discarded after a single use and, preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner). Disposable absorbent articles include feminine hygiene articles, diapers, incontinent briefs, incontinent
10 undergarments, incontinent pads, training pants, and the like. A preferred disposable absorbent article of the present invention is a feminine hygiene article.

Herein, the term "feminine hygiene articles" refer to a disposable absorbent article used by women for catamenial protection. Such feminine hygiene articles include sanitary napkins, tampons, interlabial products, incontinence devices, and
15 pantiliners.

Herein, the term "different types of absorbent articles" refers to absorbent articles which include at least one of the absorbent articles having a different physical property or structure from that of the other one of the absorbent articles. Examples of physical property or structure include the absorbent capacity of
20 absorbent articles, the dimension(s) (e.g., the longitudinal length, the traversal width and/or the thickness) of absorbent articles, the kinds of absorbent articles (e.g., sanitary napkins, tampons, interlabial products, incontinence devices, pantiliners, diapers, incontinent briefs, incontinent undergarments, and training pants.), and the combination thereof.

Fig. 1 is a simplified perspective illustration of disposable absorbent products
25 100 which is one preferred embodiment of the present invention. In this embodiment, two disposable absorbent products 100 which are identical are shown. The disposable absorbent product 100 includes a plurality of bags 10 which are successively connected. Each two of the succeeding bags 10 are separated by
30 each one of a plurality of unitary seal bands 11. Each of the bags 10 contains at least one disposable absorbent article (not shown in Fig. 1). Each of the bags 10 has a separation means 12 for separating one of the succeeding bag 10 from the other bag(s) 10 by tearing. The successively connected bags 10 are formed from a continuous tube 16 of a thin sheet material.

The bag 10 can be formed by any thin sheet material and can take any structure known in the art. For example, the bag 10 may be a paper bag which is
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formed by a paper material. In the preferred embodiment shown in Fig. 1, the bag 10 is a flexible bag which is formed by a thin film material. Such a thin film material may be made of plastic, or any recyclable material, and may take a laminate structure comprised of two or more of the aforementioned materials. The thin film
5 material may also be of non-biodegradable or non-recyclable materials, such as polymeric films (e.g., polypropylene films and polyethylene films). The material for the bag 10 is preferably at least translucent, and more preferably transparent so that purchasers (or consumers) of the disposable absorbent products can see the disposable absorbent articles contained in each bag 10 through the translucent or
10 transparent bag 10. A preferred film material for the bag 10 of the embodiment shown in Fig. 1 is a polyethylene film supplied from Shanghai Lianbin Plastic Industry Co., Ltd., Shanghai, China, under Code No. 60087793.

The continuous tube 16 has a longitudinal axis LA in the longitudinal direction LD. The traversal direction TD is defined as the direction that is perpendicular to the
15 longitudinal axis LA (or the longitudinal direction LD). The top and bottom portions of each bag 10 are closed by the unitary seal bands 11 which are formed substantially along the traversal direction TD, respectively. Any closure structure known in the art can be taken to form each bag 10. For example, the inner walls of the facing materials of the continuous tube 16 can be simply joined together by the
20 unitary seal bands 11 to form each bag 10. Preferably, the materials of the continuous tube 16 are joined by the unitary seal bands 11 to form gusset structures 17 in each bag 10 as shown in Fig. 1. Any technology for forming a gusset structure from a continuous tube member known in the art can be used.

Each bag 10 includes a front panel 31, a rear panel (not shown in Fig. 1)
25 opposed to the front panel 31, side panels 33 which connects the front and rear panels, a top panel 34 which connects the front panel 31, the rear panel, and the side panels 33, and a bottom panel 35 opposed to the top panel 34. Each pair of the front panel 31 and the rear panel, and the side panels 33 are preferably substantially planar as shown in Fig. 1. The gusset structure 17 is formed by
30 forming a gusset in the side panel 33 and sealing the uppermost ends of the front and rear panels, including the inwardly folded side gusset.

Herein, the term "unitary seal band" refers to a band area of two sheet materials that bonds the two sheet materials together. Herein, the term "band area" refers to an area that has a width and a length. In the embodiment shown in Fig. 1,
35 the unitary seal bands 11 has a width in the longitudinal direction LD and a length in the traversal direction TD. Preferably, the unitary seal bands 11 has the width from

about 0.2 mm to about 5 mm. In the preferred embodiment shown in Fig. 1, the unitary seal bands 11 has the width of about 0.5 mm, and the length of about 88 mm.

The unitary seal band should not include any separation means (such as the 5 separation means 12, described hereinafter) that facilitate tearing of the sheet materials.

The unitary seal band may bond the two sheet materials within the entire band area. Fig. 2 shows a preferred example of such a unitary seal band 11. Referring to Fig. 2, the two bags 10 are successively connected and separated by 10 the unitary seal band 11. The two sheet materials of the continuous tube 16 are bonded within the entire band area 40 to form the unitary seal band 11 shown in Fig. 2. However, the unitary seal band 11 does not necessarily need to bond the two sheet materials within the entire band area, i.e., the unitary seal band 11 may include a portion that does not bond the two sheet materials in the band area. Fig. 3 15 shows an another preferred example of the unitary seal band 11. Referring to Fig. 3, the unitary seal band 11 is formed by the band area 40' that has two sub seal bands 41 and 43 separated by a unsealed band area 42 disposed therebetween. In this embodiment, the unsealed band area 42 has no bonding portion, i.e., the tube materials in this area 43 does not contribute to bond the two sheet materials. It 20 should be noted that the shapes of the sub seal bands 41 and 43, and the unsealed band area 42 shown in Fig. 3 are merely examples, and other shapes can be chosen by the skilled person in the art.

The bond (or seal) which forms the unitary seal band 11 may be either an adhesive bond or a fusion bond. Any adhesive/fusion technology known in the art 25 can be used for making the unitary seal band 11. In the embodiment shown in Fig. 1, a fusion bond which is often called "heat seal" is preferably employed. To form such a fusion bond between the two sheet materials, an appropriate pressure as well as a heat is applied to the two sheet materials in the band area 40.

Referring again to Fig. 1, the separation means 12 is provided in each bag 30 10. For an easy opening of the bag 10 (or an easy separation of the bags 10), the separation means 12 is preferably positioned at an upper portion of each bag 10 which is above the top portion of the disposable absorbent article contained in the bag 10. More preferably, the separation means 12 is positioned above the top portion of each bag 10 and right below the unitary seal band 11 as shown in Fig. 1 35 so that the contained absorbent article can be still held within the bag 10 even after the bag 10 is opened by tearing through the separation means 12.

The separation means 12 may be any means or structure known in the art which can facilitate a separation of one sheet member into two members. A preferred separation means includes a line of weakness and/or a notch (or a cut) formed in the bag 10.

5 In the embodiment shown in Fig. 1 (and Fig. 2), the separation means 12 is a line of weakness 14 which is formed in the top panel 34 and extends substantially in the traversal direction TD (or parallel to the unitary seal band 11). By forming the line of weakness 14 within the top panel 14 which is substantially untensioned (or low tensioned), this line of weakness 14 can be designed to rupture at a relatively 10 low level of tearing force. If desired, the line of weakness 14 may extend into other panels than the top panel 34 such as the front panel 31 and/or the side panels 33. The continuous line of weakness 14 preferably includes a line of perforation formed in the bag 10.

15 In an alternative preferred embodiment, the separation means 12 is a notch (or cut) 15 which is formed in the bag 10, more preferably in the top panel 34, as shown in Fig. 3. Such a notch can take any sizes and shapes as long as it can facilitate an initiation of the separation of two succeeding bags 10. The separation means 12 may include both the line of weakness 14 and the notch 15, if desired.

20 In a preferred embodiment, each of the bags 10 contains a plurality of disposable absorbent articles (not shown in Fig. 1). Preferably, such disposable absorbent articles are contained in an inner package 13. The inner package 13 can be formed by any material and can take any structure known in the art. For example, the inner package 13 may be a carton which is formed by a cardboard material. Preferably, the inner package 13 is a flexible bag which is formed by a thin 25 sheet material. Such a thin sheet material may be made of paper, plastic, or any recyclable material, and may take a laminate structure comprised of two or more of the aforementioned materials. The package material may also be of non-biodegradable or non-recyclable materials, such as polymeric films (e.g., polypropylene films and polyethylene films).

30 Preferably, the inner package 13 is a flexible bag which is also formed from a continuous tube of a thin sheet material (e.g., a polyethylene film).

35 In a preferred embodiment, the bag 10 (or the inner package 13) contains a single type of disposable absorbent articles which are stacked. Alternatively, the bag 10 (or the inner package 13) may contain two (or more) different types of absorbent articles which are stacked. Preferably, the disposable absorbent articles contained in the bag 10 are feminine hygiene articles such as sanitary napkins,

tampons, interlabial products, incontinence devices, and pantiliners. In one preferred embodiment, three types of sanitary napkins are contained in one bag 10 as the disposable absorbent articles. Such three types of sanitary napkins have different dimensions so that they have different absorbent capacities. In a preferred 5 embodiment, a first type of the sanitary napkins has a longitudinal length of about 300 mm (for the highest absorbent capacity for the overnight use or a heavy flow use), a second type of the sanitary napkins has a longitudinal length of about 260 mm (for the middle absorbent capacity for a moderate flow use), and a third type of the sanitary napkins has a longitudinal length of about 200 mm (for the lowest 10 absorbent capacity for the light daytime use or a low flow use). These changes in the longitudinal lengths of the sanitary napkins can provide differences in the absorbent capacities.

Such differences in the absorbent capacities are preferred by users since the disposable absorbent articles which are consumed in one day by a user normally 15 have different usage time lengths. For example, the disposable absorbent articles which are used in the daytime are replaced more often than those which are used in the nighttime. In another example, depending on the days in the menstruation period, the amount of body fluids discharged from the body of a woman generally changes. More specifically, the sanitary napkins which are used in the second day. 20 of the menstruation period are replaced more often than the sanitary napkins which are used in the other days in the menstruation period. From these facts, a disposable absorbent product which contains disposable absorbent articles having different absorbent capacities is preferred by users.

Preferably, each of the feminine hygiene articles such as sanitary napkins 25 (contained in the bag 10 or the inner package 13) includes an individual flexible wrapper or bag (not shown in Fig. 1) which wraps or contains the respective article. Alternatively, the absorbent articles can be directly stored in the bag 10 or the inner package 13 without being individually wrapped or contained by a flexible wrapper or bag.

The disposable absorbent articles can be stored in the bag 10 without being folded. Preferably, at least a part of the disposable absorbent articles are folded inwardly. The folding operation for the disposable absorbent articles is preferably carried out before or when they are stored in the bag 10, the inner package 13, or the flexible wrapper or bag. For example, when the disposable absorbent articles 30 are sanitary napkins, each sanitary napkin is folded along at least one traversal folding line of the sanitary napkin, preferably two traversal folding lines so that the 35

sanitary napkin is folded into at least two (or three) sections which are defined by the folding line(s). A preferred manner for folding and/or wrapping feminine hygiene articles (e.g., sanitary napkins) are disclosed in U.S. Patent No. 6,074,376 issued to Mills on June 13, 2000 and U.S. Patent No. 5,569,228 issued to Byrd et al. on 5 October 29, 1996.

The total number of the disposable absorbent articles contained in the bag 10 or the inner package 13 may change depending on the target usage time length for one bag 10. For example, in one preferred embodiment wherein the disposable absorbent articles are sanitary napkins, the total number of the sanitary napkins is 10 preferably from 15 to 25. In another preferred embodiment wherein the bag 10 contains, for example, three different types of sanitary napkins, the sanitary napkins for the overnight use or a heavy flow use is from 6 to 12, the sanitary napkins for a moderate flow use is from 4 to 8, and the sanitary napkins for the light daytime use or a low flow use is from 3 to 7. In an yet another preferred embodiment wherein 15 the disposable absorbent articles are three different types of sanitary napkins and the target usage time length for one bag 10 is one menstruation period, the sanitary napkins for the overnight use or a heavy flow use is from 6 to 12, the sanitary napkins for a moderate flow use is from 4 to 8, and the sanitary napkins for the light daytime use or a low flow use is from 3 to 5.

20 When the disposable absorbent articles contained in the bag 10 are other kinds of absorbent articles than the sanitary napkins such as tampons, interlabial products, incontinence devices, pantiliners, diapers, incontinent briefs, incontinent undergarments, and training pants, the total number as well as the number of each type of the disposable absorbent articles contained in one package is determined by 25 considering the absorbent capacities and the target usage time lengths of disposable absorbent articles contained in one bag 10.

In a preferred embodiment, prior to insertion into in the bag 10 or the inner package 13 (e.g., a flexible bag), the disposable absorbent articles which are stacked are preferably subjected to compression to reduce at least one or, if 30 desired, the overall dimension of the bag 10 (or the inner package 13). In addition, the stacked disposable absorbent articles which have been compressed are maintained in their compressed state by the opposing side panels 33 of the bag 10.

In a preferred embodiment, the disposable absorbent product 100 further includes a hanger means 30. Any hanger means or structure known in the art can 35 be used. The continuous tube 16 of the thin sheet material has one end 18 joined to the hanger means 30. In the preferred embodiment shown in Fig. 1, the hanger

means 30 is a hanger board having a joint structure which is used for joining the end 18 of the continuous tube 16 to the hanger board. A preferred material for the hanger board is a cardboard material. In a preferred embodiment, the joint structure is a hole (not shown in Figs.) formed in the hanger board. The end 18 of the
5 continuous tube 16 is put through the hole and folded back upon itself and joined thereto.

In use, the disposable absorbent product 100 can be suspended for display from any hook which is in stores through the end 18 of the continuous tube 16. This manner of display does not require a large space in the horizontal direction since
10 disposable absorbent articles contained can be disposed in the vertical direction in the stores. Thus, the disposable absorbent articles that can be displayed by using a very limited space. In addition, the suspended disposable absorbent articles can be easily seen by consumers or purchasers. Thus, the disposable absorbent articles can be effectively displayed in relatively smaller stores. When the disposable
15 absorbent article contained in one bag 10 is sold by a store to a purchaser, the bag 10 is opened by tearing through the separation means 12. The purchaser is expected to take the disposable absorbent article while leaving the bag 10 which were opened in the store.

Fig. 5 is a simplified plan view of a manufacturing process (or method) for
20 making the disposable absorbent product of the present invention, e.g., the disposable absorbent product 100 shown in Fig. 1.

In the step 51, a continuous tube 16 of a thin sheet material having one open end 19 is prepared. The continuous tube 16 has a plurality of separation means 12 formed in the continuous tube which are spaced apart with a
25 predetermined distance PD. Fig. 4 is a simplified perspective illustration of such a continuous tube 16 of a thin sheet material. Preferably, the other end 20 of the continuous tube 16 is closed or sealed by a unitary seal band 11 (not shown in Fig 4 but in Fig. 5).

In the step 52, at least one disposable absorbent article 21 is supplied into
30 the continuous tube 16 from the open end 19. The disposable absorbent article 21 is positioned at a first position that is below one of the plurality of separation means 12.

In the step 53, a unitary seal band 11 is formed at a second position that is upper than the first position thereby forming a bag 10 which contains the disposable
35 absorbent article 21.

In the step 54, the steps 52 and 53 are conducted repeatedly so that an expected number of the bags 10 which are successively connected can be produced.

It is understood that the examples and embodiments described herein are for 5 illustrative purpose only and that various modifications or changes will be suggested to one skilled in the art without departing from the scope of the present invention.

WHAT IS CLAIMED IS:

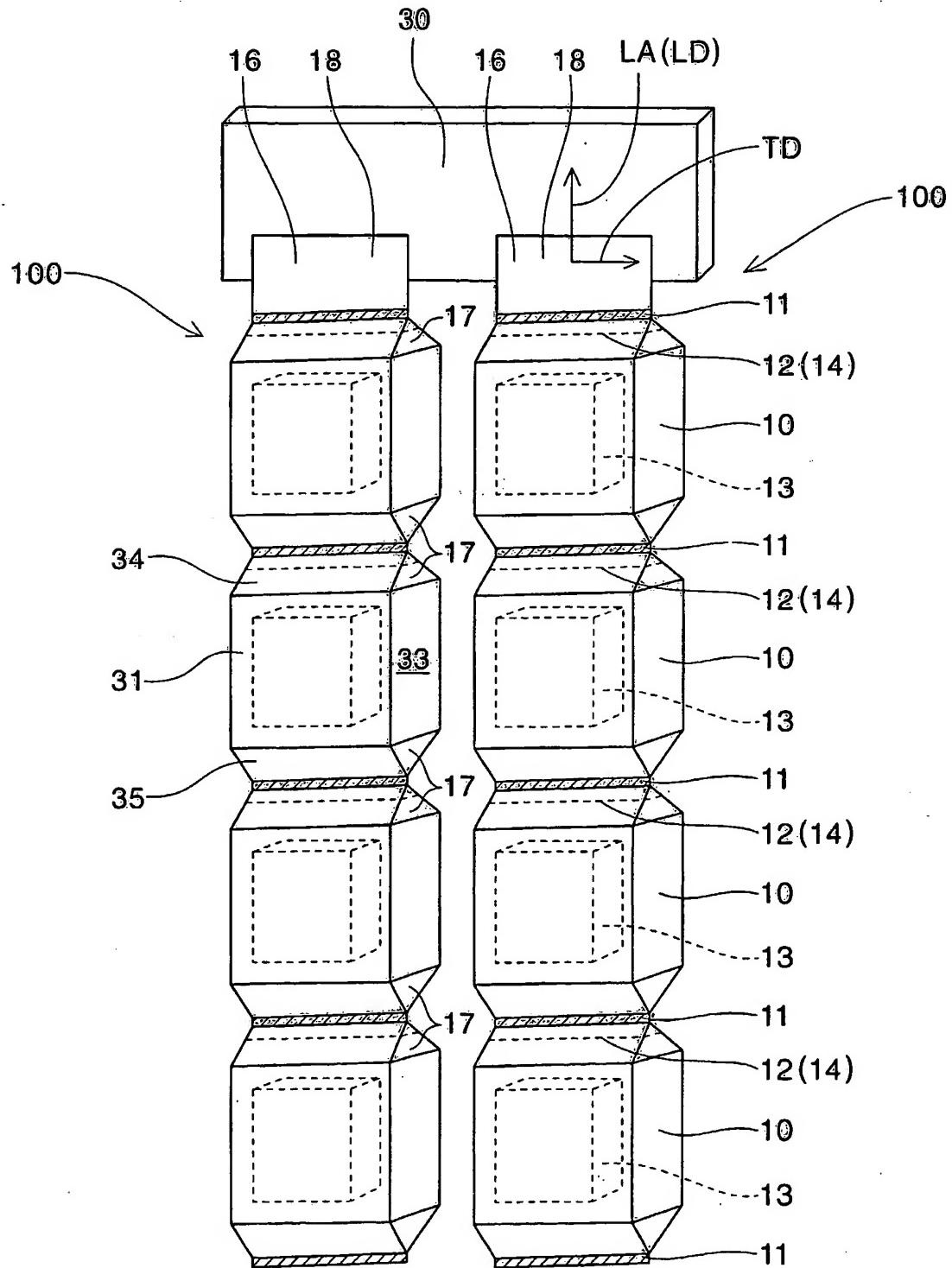
1. A disposable absorbent product, comprising:
a continuous tube of a thin sheet material having a plurality of unitary seal bands to form a plurality of bags which are successively connected, each two of the succeeding bags are separated by each one of the unitary seal bands, each of the bags containing at least one disposable absorbent article, each of the bags having a separation means formed in the thin film material for separating one of the succeeding bag from the others by tearing;
wherein when one of the succeeding bag is separated from the others through the separation means by tearing, the one bag is opened automatically.
2. The disposable absorbent product of Claim 1, wherein the separation means includes a line of weakness formed in the thin sheet material.
3. The disposable absorbent product of Claim 1, wherein each of the bags contains a plurality of disposable absorbent articles which are contained in an inner package.
4. The disposable absorbent product of Claim 1 further comprising a hanger means, wherein the continuous tube of the thin sheet material has one end joined to the hanger means.
5. The disposable absorbent product of Claim 1, wherein the disposable absorbent article is a feminine hygiene article.
6. The disposable absorbent product of Claim 1, wherein the feminine hygiene article includes a plurality of feminine hygiene articles having at least two different types.
7. A method for making a disposable absorbent product including a plurality of successively connected bags each containing at least one disposable absorbent article, the method comprising the steps of:
 - (a) preparing a continuous tube of a thin sheet material having one open end, the continuous tube having a plurality of separation means formed in the continuous tube which are spaced apart with a predetermined distance;

(b) supplying at least one disposable absorbent article into the continuous tube from the one open end, the disposable absorbent article being positioned at a first position that is below one of the plurality of separation means; and

(c) forming a unitary seal band at a second position that is upper than the first position.

8. The method of Claim 7 further comprising the step of repeating the steps (b) and (c).

Fig. 1



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Fig. 2

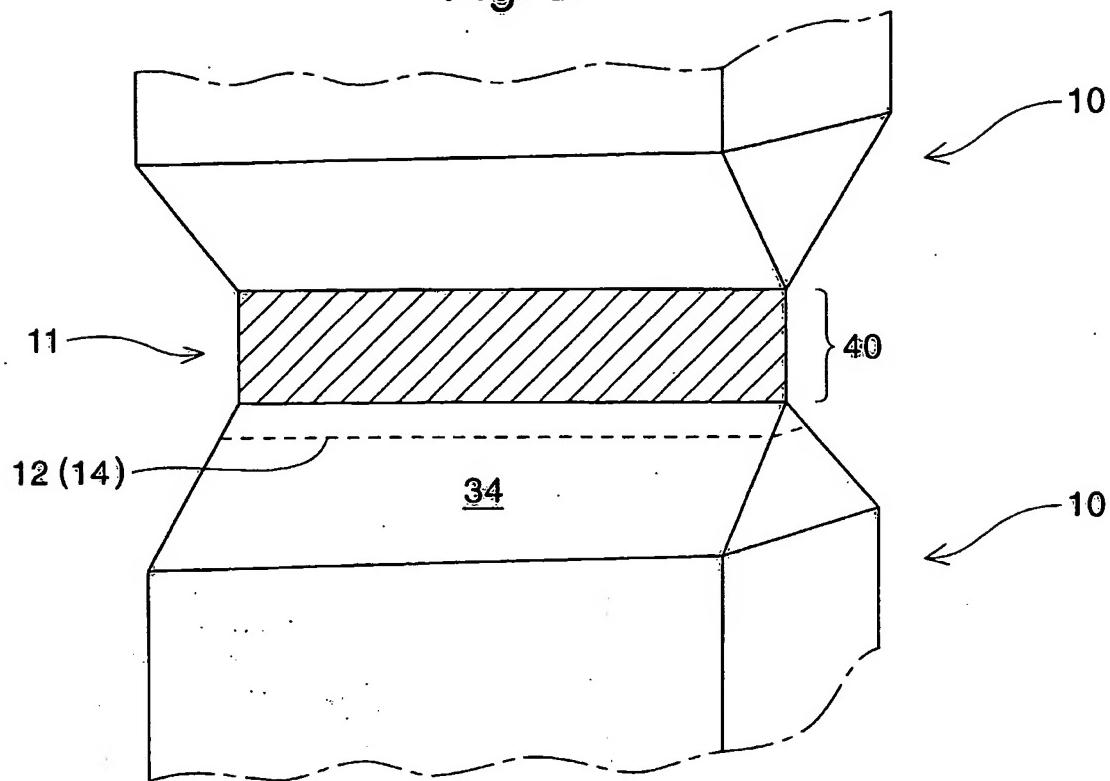
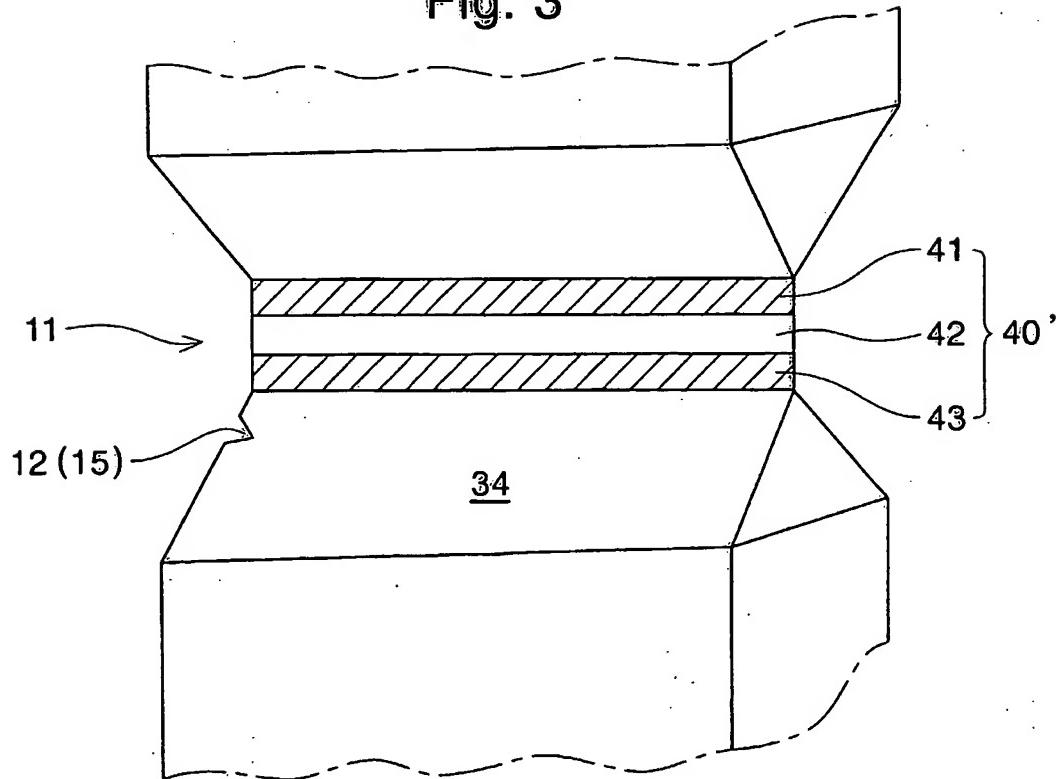
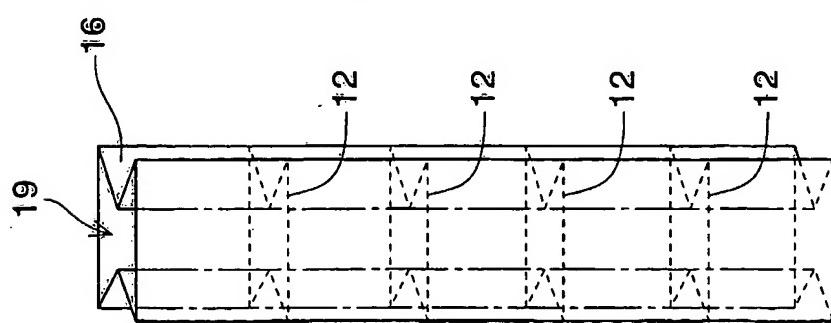
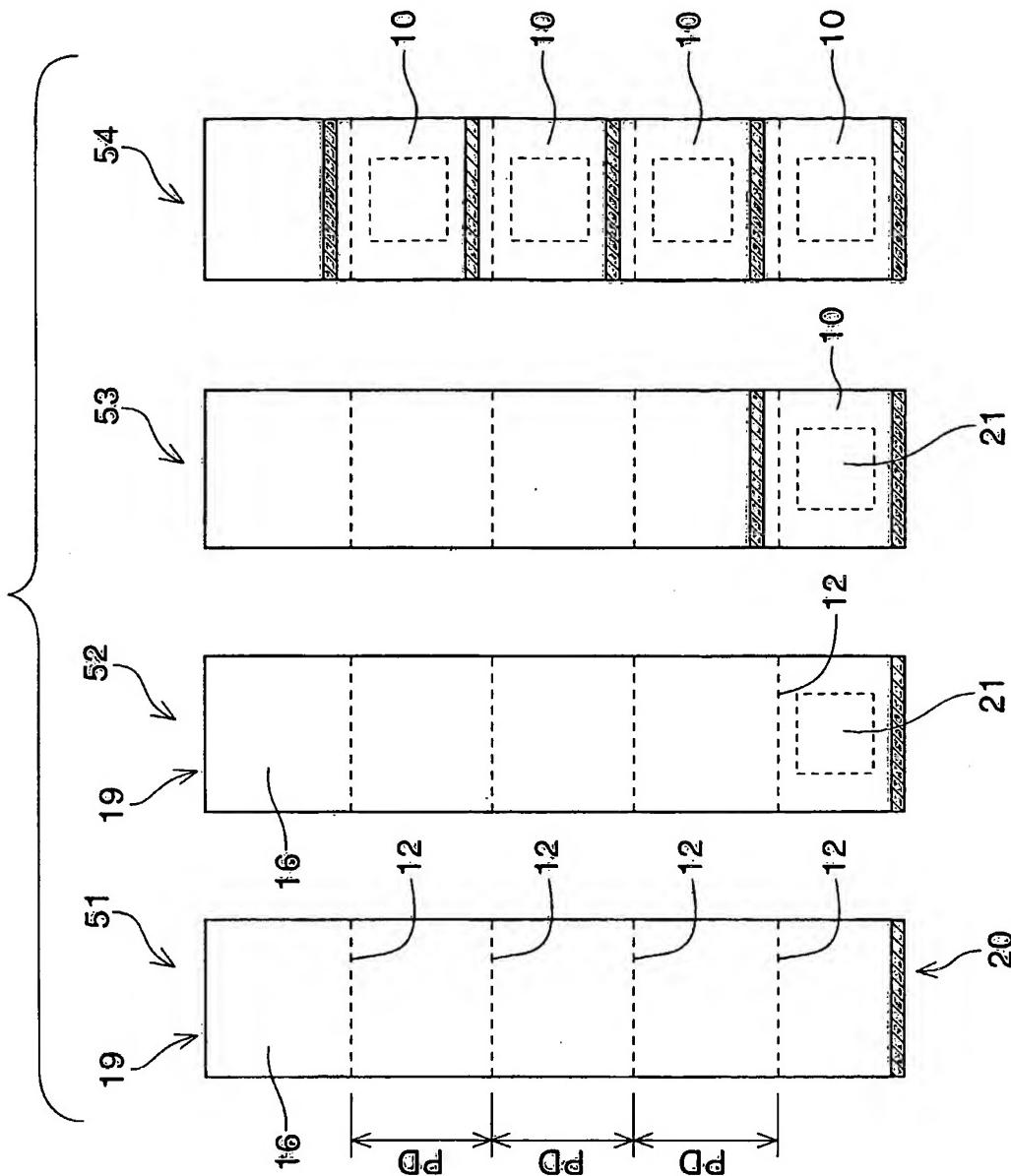


Fig. 3



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Fig. 4**Fig. 5**

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 02/16041

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: B65D 75/42, B65B 9/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: B65B, B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 8810220 A1 (RENA TRADING AB), 29 December 1988 (29.12.88), page 2, line 7 - line 13; page 4, line 36 - page 5, line 26 --	1-6
X	DE 19842586 A1 (SIMON, UDO), 23 March 2000 (23.03.00), column 1, line 47 - line 52; column 2, line 17 - line 21 --	1-6
X	US 2194451 A (L.D. SOUBIER), 19 March 1940 (19.03.40), figure 2	7-8
A	--	1-6

 Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	
"A"	document defining the general state of the art which is not considered to be of particular relevance
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Date of the actual completion of the international search

2 Sept 2002

Date of mailing of the international search report

20.09.02

Name and mailing address of the International Searching Authority

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 02/16041

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 3128547 A1 (SARTORIUS GMBH), 3 February 1983 (03.02.83), figure 2	7-8
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 02/16041

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DE	19842586	A1	23/03/00	NONE		
US	2194451	A	19/03/40	NONE		
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